1969 Results in Michigan

Buying and Selling Tart Cherries by Volume

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During the 1969 harvest season, about 50 million pounds of tart cherries were bought by the volume method in Michigan. Both growers and processors were satisfied.

Other growers and processors who have had no experience with buying and selling tart cherries by volume desire information about the method. In the past, cherries have always been sold by weight. Only recently has interest in buying by volume arisen.

Reasons for the interest in buying tart cherries by volume are threefold: (1) About 80% of Michigan cherries are now handled in water. The occurrence of water with cherries makes difficult the determination of true cherry weight. (2) Buying cherries by volume makes possible top quality and utmost efficiency. Cherries are not rehandled but remain in the same container from harvest time to processing time. The avoidance of rehandling greatly reduces scald counts and improves pack-out yields. (3) Belt scales, which weigh cherries after draining, are used widely and have proven to be satisfactory. However, they are relatively expensive and may not be practical for receiving stations and other places. Moreover, use of the scales requires rehandling of cherries.

Previous Action

In 1966 the Agricultural Engineering Research Division and Eastern Utilization Research and Development Division of USDA, and Michigan State University, made preliminary studies on weight-volume relationships of tart cherries in water. The results indicated that buying by volume might be practical, and that under average conditions cherries suspended in water weighed 47.48 lbs. per cubic foot.

In 1967 the studies were expanded. Factors such as cherry nesting or settling, bruising, size, firmness, soluble solids content, attached stems, and water level were evaluated. The complete results of this study are available in Farm Science Research Report 70, Michigan State University, October 1968. The average weight of cherries per cu. ft. of suspension was 47.61 lbs. The principal deviation, an increase in suspension density of about 2 lbs. per cu. ft., was caused by excessive bruise damage.

In 1968 the Weights and Measures Section of Michigan Department of Agriculture conducted an independent study of cherry weight-volume relationships. The results, based on tests with more than one million pounds of cherries, showed the average weight of cherries per cu. ft. of suspension to be 47.44 lbs. The conclusion was reached that buying cherries by volume was as accurate and as fair a method as buying cherries by weight. The results are available in a report entitled, "Purchase of Red Tart Cherries by Volume While Suspended in Water", Michigan Department of Agriculture, October 1968.

In 1968 the USDA-MSU scientists again checked the cherry weight-volume relationship. They obtained a value of 47.52 lbs. of cherries per cu. ft. of suspension.

Activity in 1969

In 1969 the Michigan Department of Agriculture permitted cherries to be sold by volume on a trial basis. As mentioned previously, about 50 million pounds of cherries worth about $4,000,000 were sold by volume in Michigan. The USDA-MSU research team continued studies in the orchards, at cooling stations, and at processing plants. Typical results are shown in Table 1. The average weight of cherries per cu. ft. of suspension for the two handling treatments shown in the table was 47.53 lbs. This value, obtained from tests on two days, was the same as the average value for the entire season.

Many growers and processors want information on the person to person variability in measuring the depth of cherries in water in tanks. Accordingly, three different people each measured the depth of cherries in the same tank with the same probe. Each measurement involved setting and reading the probe. The procedure was repeated with two additional tanks. The results (Table 2) showed that the person to person variability was indeed small, and amounted to, on the average, about 0.04 inch when the depth

Table 1. Weight-volume of tart cherries in water. Lake Leelanau and Frankfort, Michigan, August 8, 1969.

Tank	Cherries	Belt scale weight, lbs.	Lb.s cherries per cu. ft.	
			Travel 3 miles, 2 hr. delay	Travel 40 miles, 8 hr. delay
1	Ave. commer.	1042	47.08	47.89
2	Ave. commer.	1022	47.08	48.30
3	Alar treated	1056	47.14	47.80
4	Alar treated	1030	47.20	47.64
		Average	47.13	47.93
		Average of both	47.53	

Table 2. Person to person variation in setting and reading probe for weight-volume measurments of tart cherries in water. Traverse City, Michigan, August 7, 1969.

Person making determination	Depth of cherries, inches — Tank 1	Tank 2	Tank 3	Average*
A	24.48	24.35	25.82	24.88
B	24.42	24.39	25.96	24.92
C	24.58	24.32	25.97	24.96
Average	24.49	24.35	25.92	

*Average deviation was equivalent to 2 lbs. of cherries per 1186 lb. sample.

was 24.92 inches. In terms of cherries, the variability was 2 lbs. in a total weight of 1186 lbs.

Changes in Volume

Growers and processors want also to know about the changes in cherry volume that occur between the orchard and cannery. In 1969, therefore, we measured the changes obtained by two growers (see Table 3). The results confirmed our previous findings that cherries in water settle rapidly during the first stages of transporting. Additional travel plus the time required, caused very little change in cherry volume. In the present tests, the average change in volume occurring between orchard and cannery was -1.9%. This change, a shrinkage, was less than that which occurs in lug handled cherries under similar circumstances. We can conclude that cherries in water should be transported for at least one mile after removal from a cooling pad before volume determinations are made.

Summary and Significance

The tart cherry industry must go forward. The development and use of a new method of measuring quantities of cherries should be a significant aid to progress. Before adoption, however, any new method should be tested thoroughly. In the present case, adequate testing has been done. Tests have been conducted in most of the cherry growing areas of Michigan for a four year period. The results (see Table 4) show a remarkable degree of consistency. Over the four year period the average weight of cherries in a cubic foot of water suspension was 47.516 pounds. With this figure, or one quite similar, the worth of cherries per pound can easily be translated into worth per volume.

The amount of money a grower receives for a given load of fruit should not be affected by the method of measuring the quantity of fruit. Both the weight method and the volume method should give the same results in terms of money. Our experience is that they do. When competent personnel are used, and when measurements are made over the entire season, the two methods are essentially equal in accuracy and in fairness to grower and processor.

The Michigan Department of Agriculture is now taking steps to legalize the buying by volume of tart cherries in water. In the future, therefore, growers and processors should be able to choose the method of measurement (weight or volume) that fits their particular needs.

Table 3. Changes in density of tart cherries in water during handling and transporting. Lake Leelanau, Traverse City, and Frankfort, Michigan, August 1969.

Grower and tank	Pounds of cherries by volume method — At cooling pad, original, 5 hour delay	Loaded onto truck	Driven 300 yds. orchard road	Driven 15 miles to cannery, 6 hour delay
Grower A				
Tank				
1	810	814	808	799
2	1013	1008	996	981
3	1143	1165	1143	1121
Average	989	996	982	967
Change	0	+0.7%	-0.7%	-2.2%

Grower B	At cooling pad after 3 mi. trip, 2 hr. delay	At cannery, after 40. mi. trip, 8 hr. delay
Tank		
4	1053	1036
5	1033	1007
6	1066	1050
7	1039	1029
Average	1048	1031
Change	0	-1.6%

Table 4. Average pounds per cubic foot of tart cherries in water. Results are based on 4 years of testing in all areas of Michigan.

Year	Lbs of cherries per cu. ft.	Research group
1966	47.48	USDA-MSU
1967	47.61	USDA-MSU
1968	47.44	Mich. Dept. Agr.
1968	47.52	USDA-MSU
1969	47.53	USDA-MSU
Average	47.516	